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Geographic, Physical, Environmental and Economic Characteristics of the

Ohio River System

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Navigation Economic Technologies Symposium

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Ohio River Basin / Inland Navigation System

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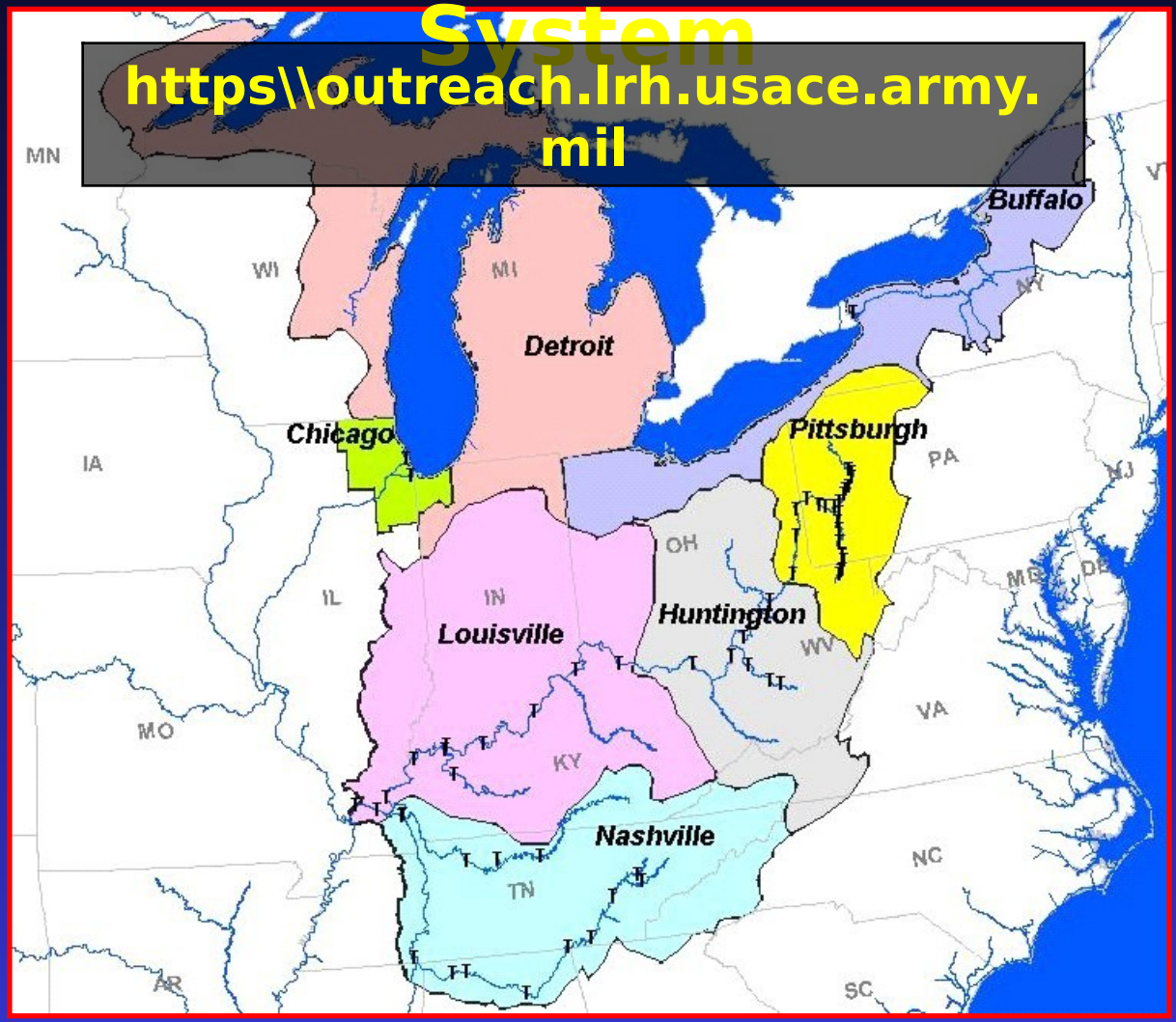
- 204,000 sq.mi. basin
- 25M people (10% of U.S.)
- resource rich
- 60 locks and dams (24/7) forming series of pools
- Industrial and public water supply
- 2,854 miles of navigable



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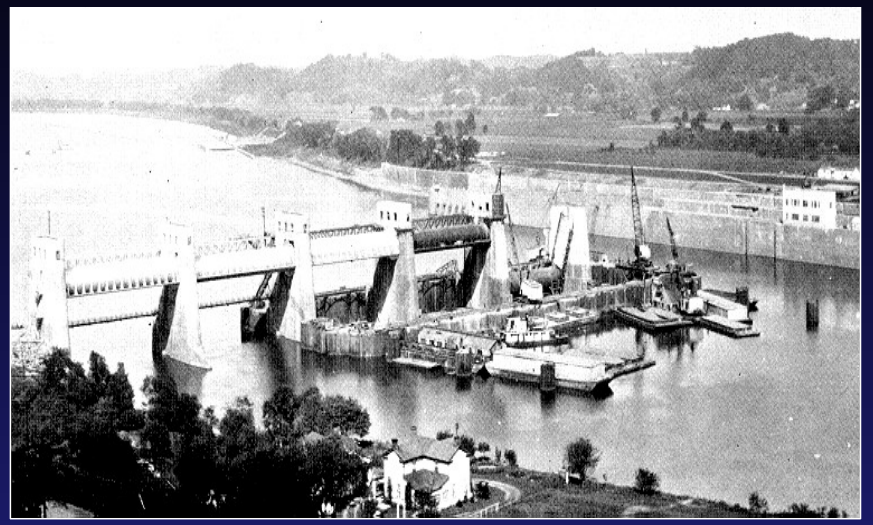
History



- federal involvement began in 1824
- canalization began in 1874
- federal canalization with 54 locks and dams (1906) completed between 191 1929
- Year round navigation spurned economic grow (water supply & low cos transportation attracted industry)
- Port cities grew

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Ohio River System Traffic Growth

- Traffic almost tripled between 1950 and 1975 (25 years)
- Traffic quadrupled between 1950 and 2000 (50 years)
- Traffic is expected to grow at an average annual rate of 1.1 percent over the next 25 years

1950 - 2000

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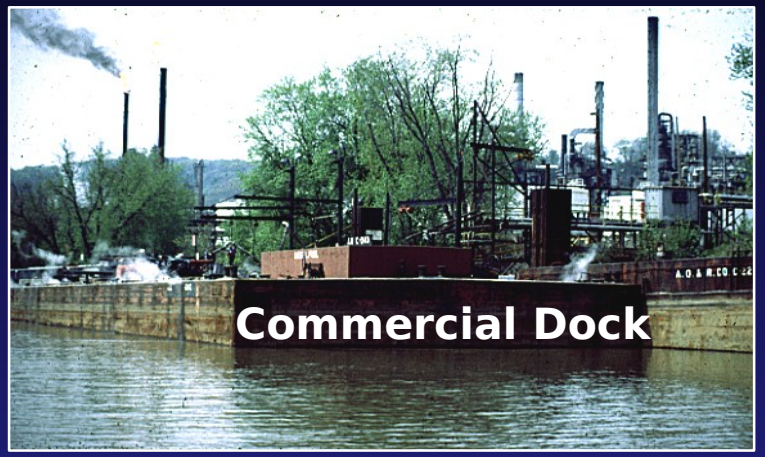
Economic Impacts of ORS

- **Commercial Navigation**
  - Energy conservation, reduced emissions
  - Over $100 billion invested in electric utility construction and industrial capital investment
- **Water Supply**
  - Municipal, Industrial - Electric Utilities
- **Recreation - Tourism**
  - Boating, Swimming, Fishing, Camping
- **Shore-side Development**
  - Ports, docks, terminals


Commercial Dock

Fleeting Facility

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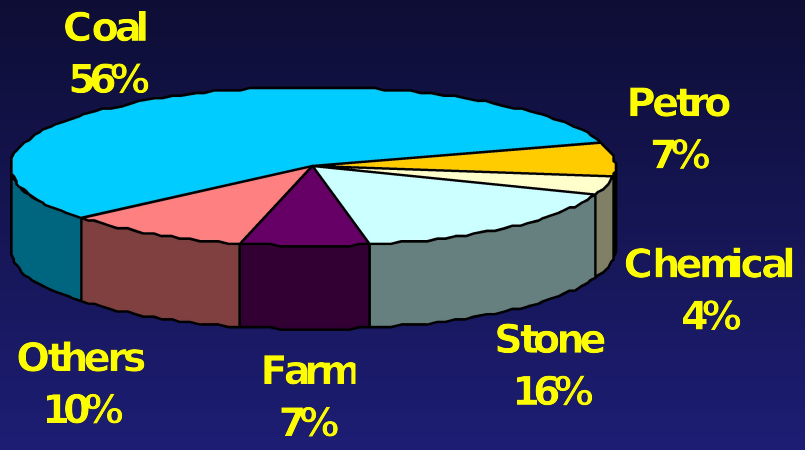
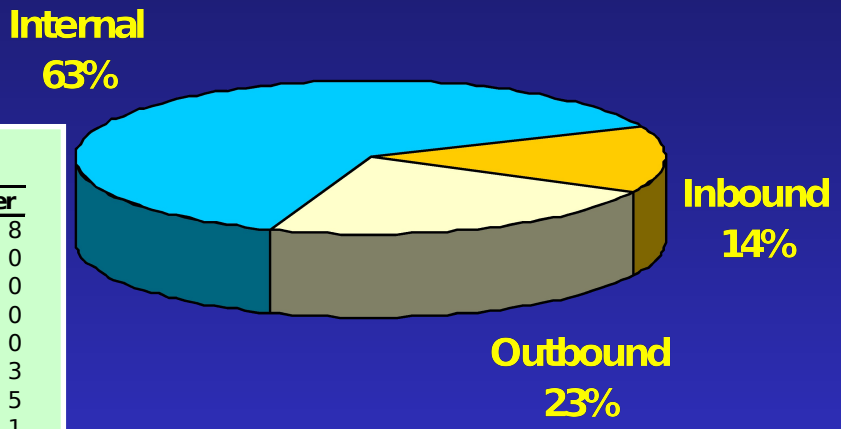
Ohio River System Traffic Mix

- 272 million tons in 2000 (primarily coal and primarily internal)
- average water haul 410-miles
- average off-river leg (to = 106, from = 6-miles)
- many geographic origin – destinations





	1997 WCSC Sample			Average Distance		
	Movements	Tons	Commodity	To River	Line-Haul	From River
	927	155,203,676	Coal	152	359	8
	82	9,116,282	Petrol Prod	0	368	0
	266	36,876,204	Aggregates	0	249	0
	79	4,194,580	Grains	48	969	0
	60	3,829,720	Chemicals	5	1,248	0
	51	5,811,666	Ores & Minerals	5	1,367	3
	50	2,434,892	Iron & Steel	1	1,045	5
	85	8,588,641	Others	3	581	1
##	1,600	226,055,661		106	410	6

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ORS Navigation is Important:

Transportation Savings- $2 billion

Business Activity - $11.5 billion

Tax Revenue – $3.0 billion

Employment – 100,000 jobs

- 150 million tons of coal a year
  - electric utilities
  - steel industry
- 124 million tons of other
  - refining
  - aluminum
  - chemicals
  - paper
  - agriculture
  - construction/cement

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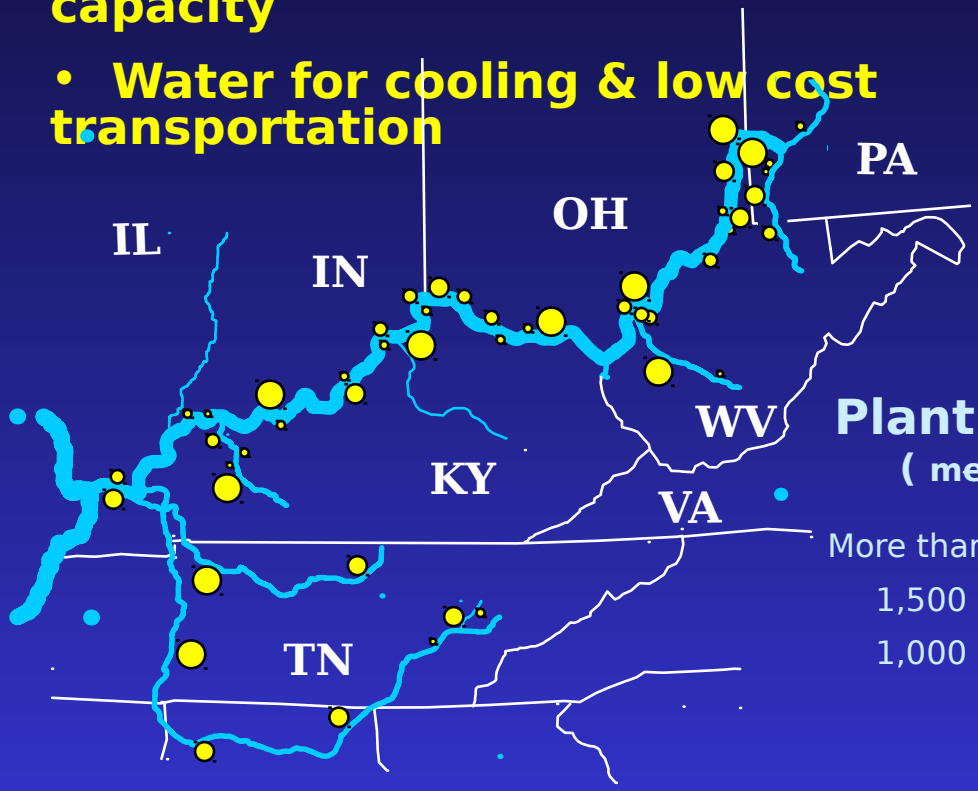
Electric Utilities

- 49 coal-fired power plants in ORB
- 20 % of nation's coal-fired capacity
- Water for cooling & low cost transportation



Plant Capacity
(megawatts)

- More than 2,500
- 1,500 - 1,999
- 1,000 - 1,499
- 500 - 999
- < 500

- Proximity to low-sulfur coal
- clean air requirements
- half of coal receipts via barge

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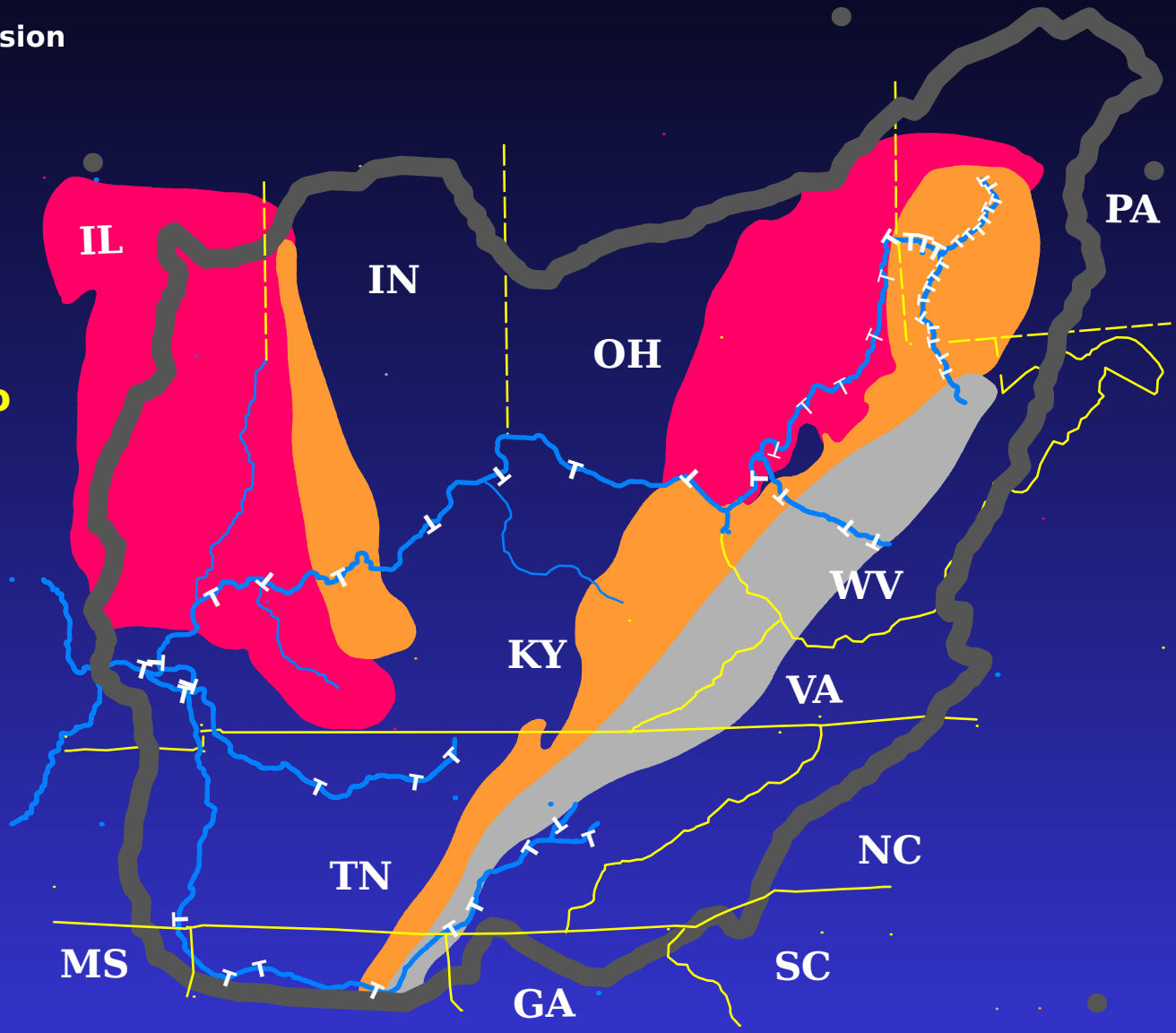
ORB Coal Reserves

- over one-quarter of nation's reserves
- over 90 percent of highest energy reserves
- sufficient reserves to continue producing coal within the basin for the next 400 years



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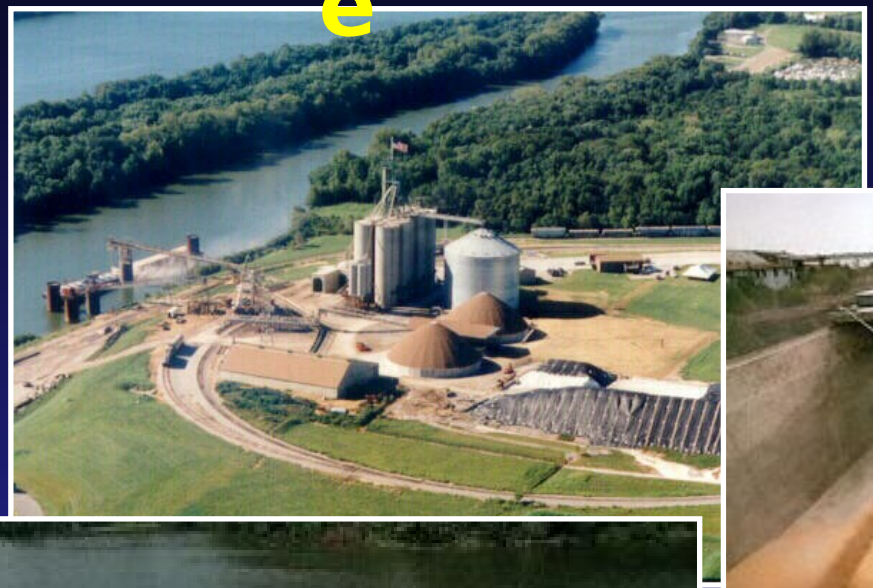
Agriculture

- over 144 water grain elevators, plants and terminals in the basin
- over 15 million tons of grain shipped in 2000
- over 2 million tons of fertilizer



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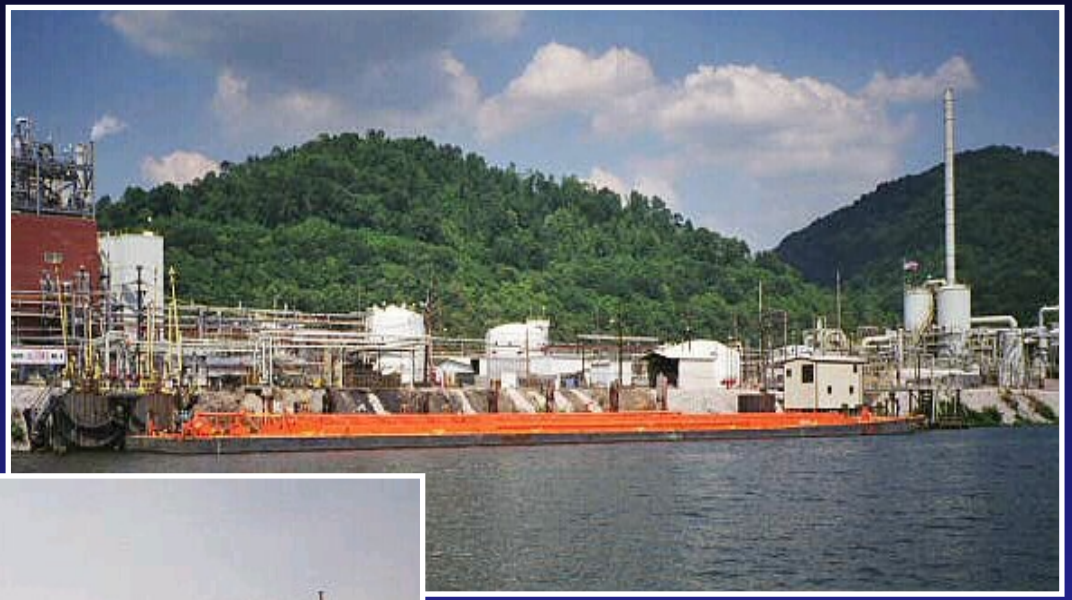
Chemicals

- more than 200 waterside chemical plants, docks and terminals

- over 10 million tons shipped in 2000



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Petroleum Products

- over 250 waterside refineries, tank farms, pipelines, factories and terminals

- over 20 million tons shipped in 2000

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Recreation - Tourism

- comprehensive recreation opportunity
- over 30 million visitors a year
- value of recreation estimated at more than $500 million

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Ports & Communities

- Huntington is the largest inland river port in the nation - 75 million tons a year
- Pittsburgh handles over 50 million tons of traffic each year
- Louisville and Cincinnati handle 25 million tons

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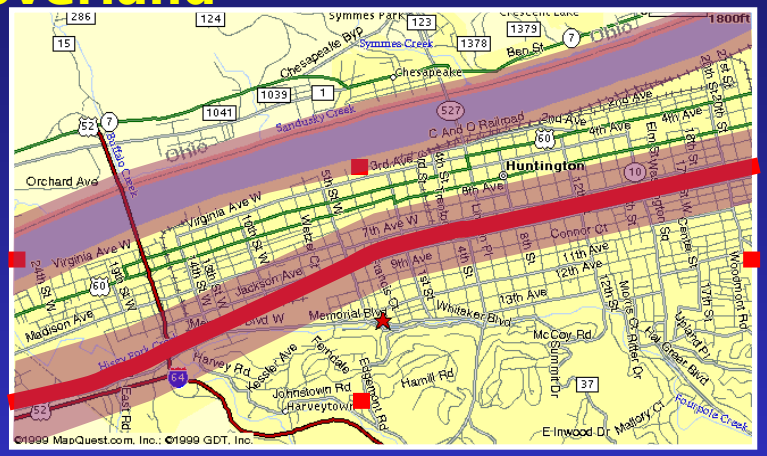
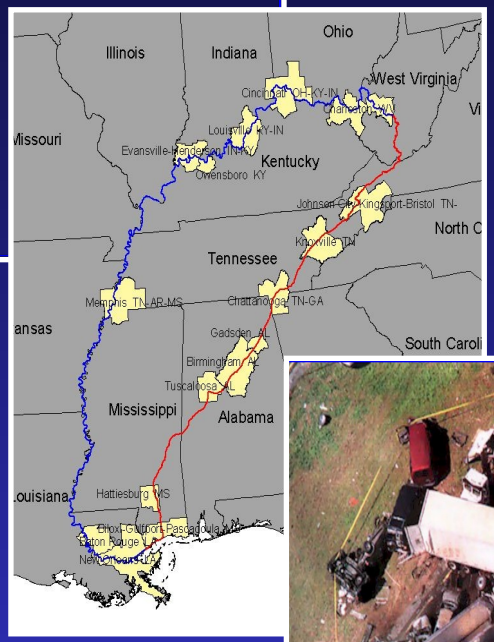
Environmental Consequences

- **Energy conservation – less fuel**
- **Reduced emissions**
- **Improved public health & safety**
- **Reduced overland congestion**



Huntington, West Virginia



Ohio River **CSXT Main Line Track age**

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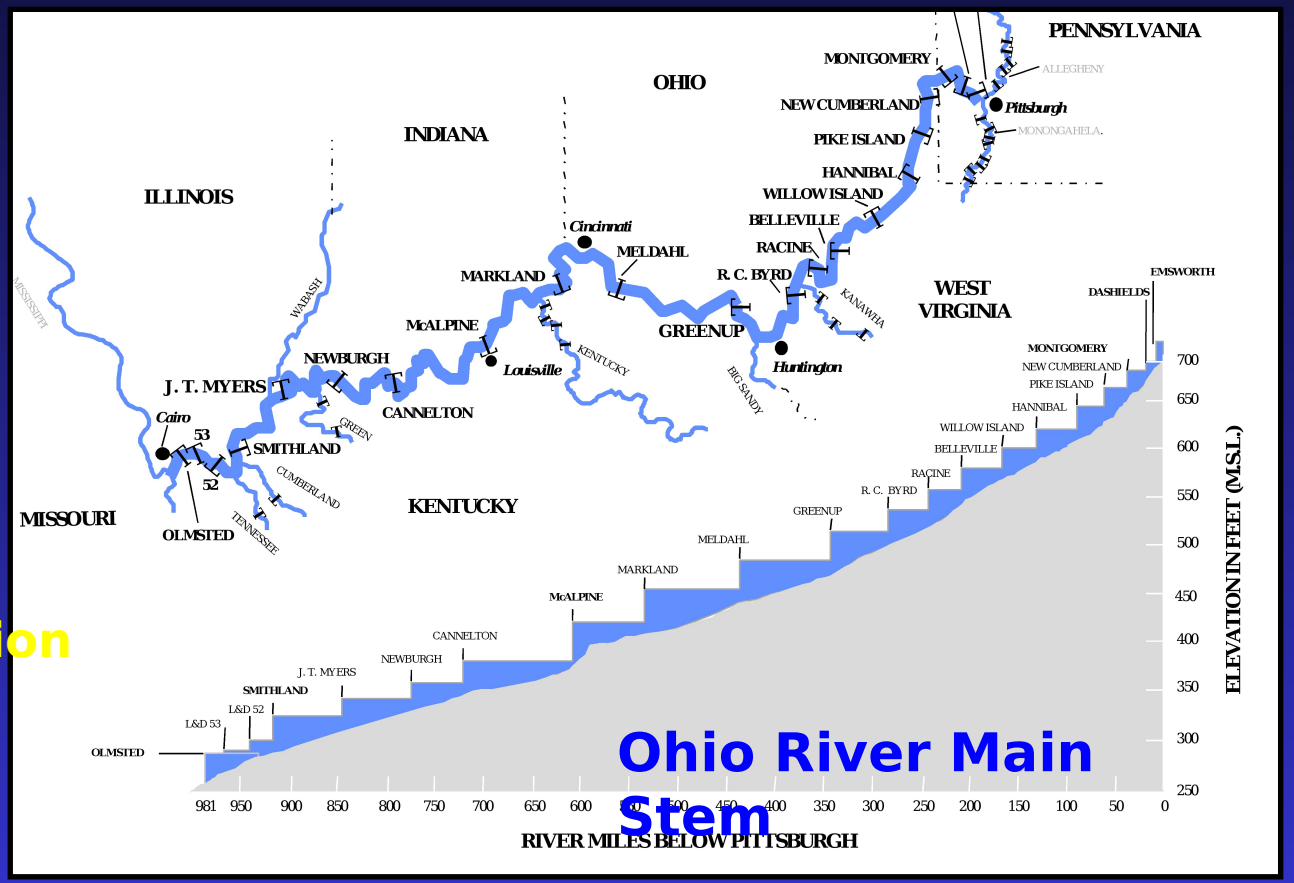
Ohio Main Stem Infrastructure Characteristics

- 20 navigation locks and dams
- Main chambers
  - 17 1200’ x 110’
  - 3 600’ x 110’
- Auxiliary Chambers
  - 1 1200’ x 110’
  - 16 600’ x 110’
  - 3 360’ x 56’
- Year round navigation



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Ohio Main Stem Infrastructure Characteristics

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Upper Ohio Characteristics

600’ x 110’ with 360’ x 56’ Aux.

- Emsworth L/D
- River Mile 6.2
- Constructed 1919-1922

- Dashields L/D
- River Mile 13.3
- Constructed 1927 - 1929

- Montgomery L/D
- River Mile 31.7
- Constructed 1932 - 1936

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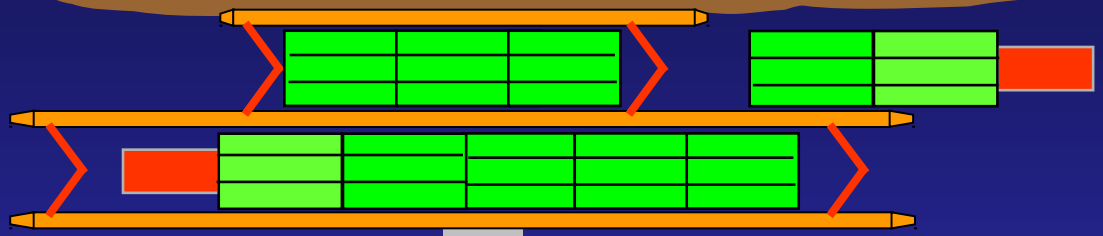
Typical Ohio River Project With Typical Ohio River Tow



Dam

Takes over twice as long for a tow to double-cut through a smaller auxiliary chamber

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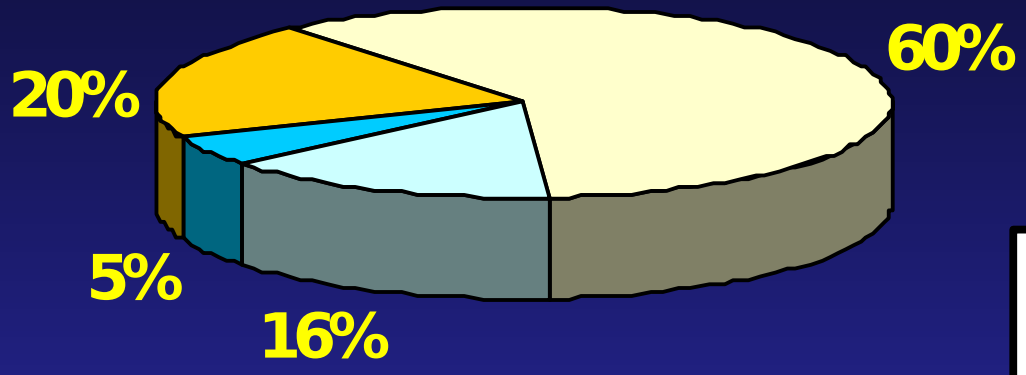
Age of Ohio River Main Chambers



Emsworth main chamber is 82 years old!

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Main Chamber Closure History

- **Main Chamber closures**
  - ***Auxiliary chamber is too small, not efficient***
  - ***Tows must double lock, taking twice as long***
- **More serious repairs will be**

Project	Date	Duration (days)	Delay Costs	Cause
Montgomery	Jul-02	17	$ 1,500,000	maintenance
Montgomery	Jun-02	11	$ 1,100,000	maintenance
Greenup	Nov-99	30	$ 3,600,000	failure
McAlpine	Sep-99	16	$ 2,700,000	maintenance
Greenup	Jun-98	19	$ 3,600,000	maintenance
McAlpine	Jul-97	36	$ 11,500,000	maintenance
Newburgh	Aug-96	7	$ 865,000	maintenance
Uniontown	Jun-95	12	$ 900,000	maintenance
Smithland	Apr-95	7	$ 83,000	maintenance
Greenup	Oct-94	10	$ 1,600,000	accident
Markland	Jul-94	40	$ 4,600,000	maintenance
Cannelton	May-94	10	$ 941,000	maintenance
McAlpine	Nov-93	12	$ 3,400,000	failure
Greenup	Oct-91	21	$ 3,400,000	accident
Greenup	Jun-91	32	$ 5,700,000	maintenance
Uniontown	Aug-89	45	$ 13,400,000	maintenance

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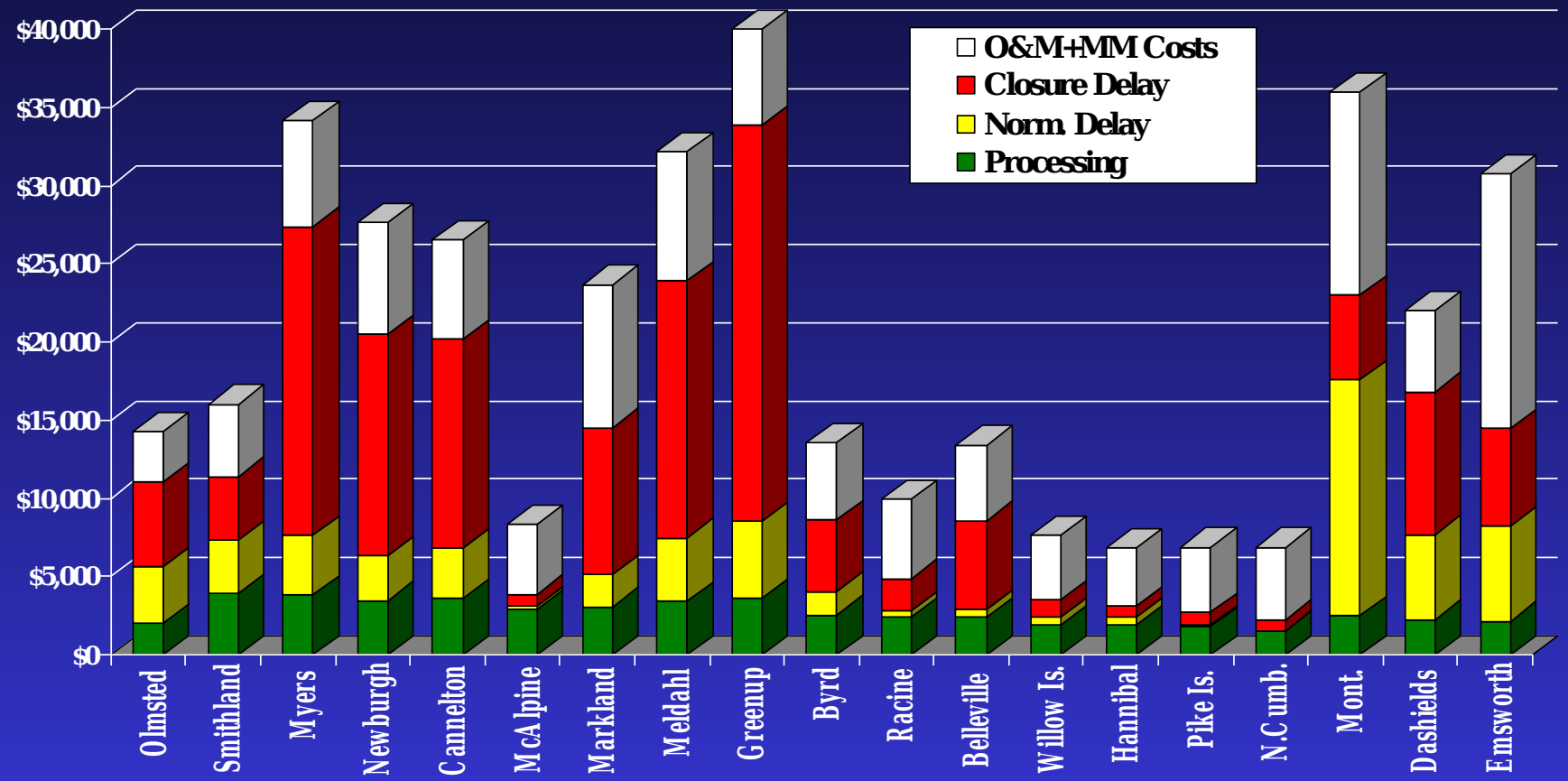
Average Annual Costs

Given Engineering Reliability

(2000-2058, base yr 2008 6.875%)



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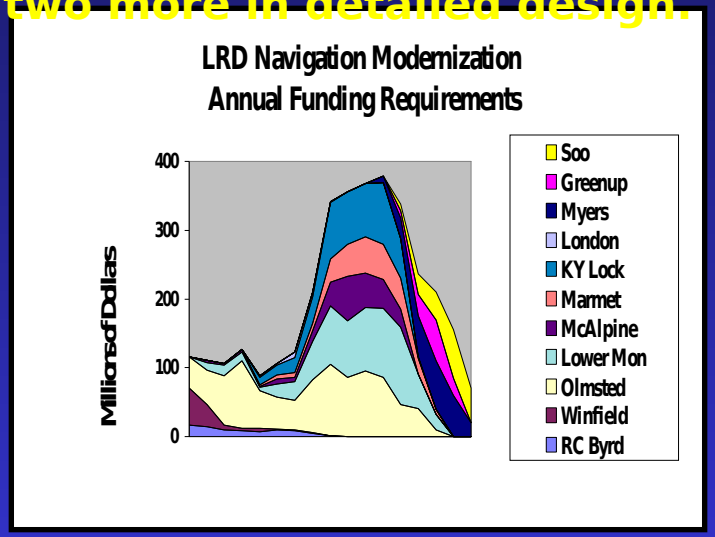
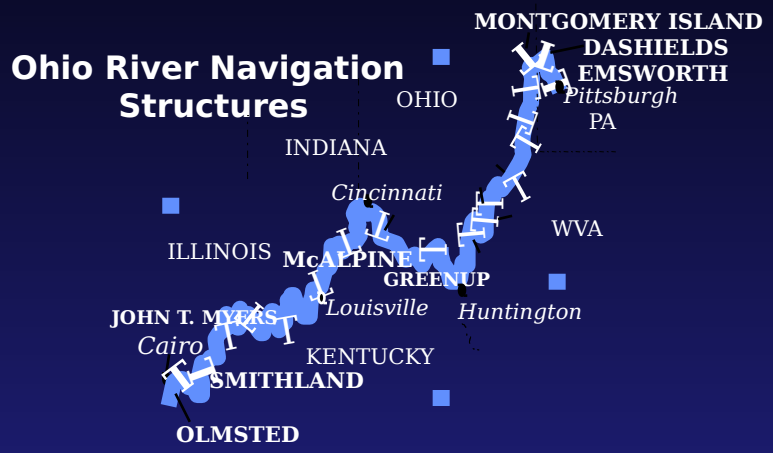
Modernization Activities

Annual investments of about $200 M are providing for the modernization of the Ohio River Navigation System.

Three major projects have been completed with five addition projects under construction and two more in detailed design.





Construction and design innovations are being pursued to reduce costs and achieve earlier occupancy.

A Navigation Account System has been established to better integrate all aspects of the navigation modernization process.

All sectors of the navigation industry and involved states actively participate in the modernization process.